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(54) Message Transmission System

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SPECIFICATION

1. Title of the Invention

Message Transmission System

2. Claims

1) In a message transmission system comprising a service signal generating device for generating service signals related to the establishment of a telephone connection between a telephone set in a telephone system and a different telephone set so that messages can be transmitted to said telephone set in the telephone system via telephone lines that are associated with said telephone set,

a message transmission system comprising a mixer having two input terminals wherein one input terminal is connected to said service signal generating device, the other input terminal is connected to a message generating device and the output terminal of said mixer is connected to said telephone line.

2) The message transmission system according to claim 1 further comprising a synchronizing circuit for synchronizing the generation of service signals and of messages.

3) The message transmission system according to claim 1 wherein said mixer consists of a transformer with two primary windings and one secondary winding, said primary windings having free terminals acting as input terminals of said mixer and a common terminal connected to ground.

4) The message transmission system according to claim 1 further comprising an inverter for forming a connection to a service signal line selection telephone line [Translator's note: Is this a typo in the original?].

5) The message transmission system according to claim 1 wherein a circuit that is connected to one input terminal of said mixer comprises an amplifier and a circuit that is connected to the other input terminal of said mixer comprises an attenuator.

6) The message transmission system according to claim 2 wherein said synchronizing circuit comprises a first circuit arrangement for controlling the on and off of said message generating device, said first circuit arrangement being connected to an incoming service signal section of a telephone line and responding to said service signal.

7) The message transmission system according to claim 6 wherein said synchronizing circuit comprises a second circuit arrangement that controls the establishment and termination of a connection between said mixer and said message generating device depending on whether a message from said message generating device is present, absent and/or has ended at an input terminal of said synchronizing circuit.

8) The message transmission system according to claim 7 wherein said synchronizing circuit interconnects said first circuit arrangement and said second circuit arrangement and comprises a means for the generation of control signals that switches off said message generating device using said first circuit arrangement when the end of a message is detected by said second circuit arrangement.

9) The message transmission system according to claim 8 wherein said first circuit arrangement comprises a control means for stopping said message generation device before the end of a message.

10) The message transmission system according to claim 7 wherein said synchronizing circuit comprises a switch that is connected between a message reception input terminal and its output terminal and also comprises a circuit for controlling said switch and responsive to the presence of a message at said message reception input terminal.

11) The message transmission system according to claim 7 wherein said first arrangement comprises a bistable multivibrator having two input terminals and two output terminals, one input terminal being connected to a detection circuit so that a signal that turns on the message generating device is generated when a service signal is detected and the other input terminal forming a control input terminal that stops or switches off said message generating device.

12) The message transmission system according to claim 11 wherein the second circuit arrangement of the synchronizing circuit comprises a bistable multivibrator wherein one input terminal detects the presence of a message at said message reception input terminal and the other input terminal detects the end of a message.

13) The message transmission system according to claim 12 wherein one input terminal of said bistable multivibrator is connected to a relay control circuit and said switch is used as a contact that is operated by said relay.

14) The message transmission system according to claim 12 wherein each bistable multivibrator comprises two NOR gates, the output terminal of one NOR gate being connected to the input terminal of the other NOR gate.

15) The message transmission system according to claim 1 comprising a message generating device, said message generating device comprising a signal generating device that generates a signal such as a data signal that is reproduced on a support such as a display screen or a printing support at a telephone set that is requesting a connection to said telephone line, said signal generating device being connected to an input terminal of a mixer, the other input terminal of said mixer receiving a service signal from a service signal generator and an output terminal of said mixer being connected to a calling subscriber line.

16) The message transmission system according to claim 15 comprising a separator that separates the service signals from the signals to be reproduced by said support in a subscriber's telephone set.

17) The message transmission system according to claim 15 further comprising a detector for detecting the presence of a service signal and another detector for detecting the moment a called subscriber telephone set answers, said detectors being connected to a control circuit for turning said message generating on and off.

18) The message transmission system according to claim 15 wherein said subscriber's telephone set is provided with a memory device for storing information received from a message generating device during the period of making a connection with a called subscriber's telephone set and for reproducing said information at any desired suitable time on a support such as a display screen or a printing support.

19) The message transmission system according to claim 15 wherein a modem is connected between said message generating device and said mixer.

20) The message transmission system according to claim 1 comprising a switch for switching said mixer on and off, said switch operating in synchrony with the controlling of said

message generating device.

3. Detailed Description of the Invention

The present invention relates to a message transmission system comprising a service signal generation device for generating service signals related to the establishment of a telephone connection or communication between a telephone set and another telephone set so that messages may be transmitted to a telephone set in a telephone system or a telephone equipment via a telephone line associated with said telephone set.

Examples of such service signals include operating signals, free line or dial tone, ringing tone signal, callback signal, routing (path selection) and line busy signal. Such signals are sent to a user of a telephone set who has lifted a handset and is trying to ring or is in fact ringing another telephone set. A user trying to use a telephone line has to take such service signals into account since these signals advise the user about the state of the telephone network or the telephone system and will determine whether the calling procedure will succeed or can continue. This means that a user is listening during substantially the whole period (except when dialing or performing some keyboard operation) while a telephone communication is being established.

The object of the present invention is to provide a system for transmitting music or messages having any characters such as advertisement text during the generation of some or all service signals.

To achieve this object, the message transmitting system according to the present invention comprises a mixer with two inputs, one of which is connected to a service signal generating device and the other of which is connected to a message generating device, and an output terminal which is connected to a telephone line.

According to a preferable embodiment of the present invention, said system may comprise a service signal and a message generation synchronizing circuit.

According to another preferable embodiment of the present invention, the mixer comprises a transformer with two primary windings and one secondary winding with the free terminals of the primary windings forming the input terminals of the mixer and the common connection terminals of the primary windings being grounded.

Another object of the present invention is to provide a system for transmitting messages to a telephone set comprising a display screen and, if necessary, other message receiving means such as a printing device. Said telephone set which, for such reasons, may be referred to as a subscriber terminal will thus be adapted to be connected to a telematic network designed for data transmission. This terminal may, for example, be connected to a videophonic network or to a data-bank consulting network.

To achieve such objects, the message transmission system according to the present invention comprises a message generator that is constructed with a signal generating device that generates data signals that are displayed or reproduced by printing at a subscriber's telephone set that is requesting a telephone connection. Said signal generating device is connected to an input terminal of a mixer. Another input terminal of the mixer receives service signals, and an output terminal of the mixer may be connected to a caller's subscriber line.

According to preferable embodiment of the present invention, the message transmission system may comprise a separator for separating the service signals from the signals to be reproduced by the subscriber's telephone set or by other support provided in the station.

According to another preferable embodiment of the present invention, the message transmission system comprises a detector for detecting the presence of service signals and, if necessary, a detector for detecting the moment an answer is made by a called subscriber's telephone set or station, both detectors being connected to a control circuit so that said message generating device can be turned on and off.

Furthermore, in practicing the present invention, it is preferable for a subscriber's telephone set or station to comprise a memory device for storing information received from said message generating device while a connection is being established with a called subscriber's telephone set or station and for reproducing such information at a desirable, suitable time on a support device such as a display screen.

The present invention is described next with reference to drawings.

As shown in FIG. 1, a telephone set to which the present invention is applicable comprises an electrical signal generating device GS adapted for the generation of a plurality of specific electrical signals that work as service signals such as operating signals, callback signal, route selection signal, busy signal and ringing signal. These signals are sent to a subscriber's telephone set whose handset is hooked. The purpose of sending these signals is to establish a telephone connection with another subscriber's telephone set or station. According to the device shown in FIG. 1, the service signals successively pass through sections A, B and then SR in the telephone network and are transmitted to the called telephone set. Each of sections SR (only two of which are shown by way of example in the figure) is connected to telephone line section B by a transformer TRS.

As clear from FIG. 1, the direct connection between telephone line sections A and B may be cut off by means of an inverter switch or a switch IN1. In this way, the message transmitting system according to the present invention is connected between the two telephone line sections.

This system comprises a mixer TRM having two input terminals E1 and E2 and one output terminal S. In the embodiment that is illustrated, the mixer comprises a transformer with

two primary windings which are installed in series. Its common connection point is grounded. The free terminal of each primary winding forms one of the two input terminals E1 and E2 of the mixer. The input terminal E1 of transformer TRM is connected to the output terminal of a differential amplifier AM. Its control terminal or drive input terminal is connected to input line section A via a switch IN1. The input terminal E2 of the mixer TRM may be connected to a message (such as voice message) generating device GM via an attenuator AT, an inverter switch IN2, a synchronizing circuit CS, an inverter switch IN3 and a suitable transformer TRG. Inverter switch IN4 allows synchronizer CS to be separated from the circuit that interconnects mixer TRM and message generating device GM. The input terminal and the output terminal of the synchronizing circuit CS for messages to be transmitted are respectively identified as E1 and S. The synchronizing circuit CS further comprises a second input terminal E2 for receiving service signals from telephone line section A. The construction of the synchronizing circuit CS is described in detail hereinbelow.

The control input terminal of amplifier AM is connected to a sliding contact of a potentiometer P1. The other terminal of said potentiometer P1 may be connected to telephone line section A. The other terminal of said potentiometer is grounded. The output terminal of the amplifier AM1 is connected through a capacitor C1 to the input terminal E1 of the transformer-mixer TRM. A circuit comprising capacitor C2 and resistor R1 that are connected in series is inserted between said input terminal E1 and ground. Furthermore, the output terminal of amplifier AM is grounded through resistors R2 and R3 that are connected in series. The second input terminal E2 of the amplifier is connected through a capacitor C3 to the common connection point of resistors R2 and R3. A capacitor C4 may be connected across input terminal E1 of the amplifier AM and the ground.

The message generating device GM may comprise one or several (for instance two, as in FIG. 1) cassette or [a phonographic] record pick-ups or some other reading device and emergency signal generator or device of choice. A [phonographic] record generator is advantageous in that it is an endless generator, but a cassette generator is advantageous in that cassettes may be quickly changed for the delivery of specific messages. In addition to the message generating device GM, the system according to the invention may comprise an external modulation source SME for the transmission of specific, occasional messages. This modulation source may be connected to mixer TRM instead of the message generating device GM either directly through switch IN2 or through a synchronizing circuit that is connected by means of an inverter switch IN3 that is installed at a position that is not illustrated in the figures.

The synchronizing circuit CS is described next with reference to FIG. 2.

The synchronizing circuit comprises two parts, namely, a first part, part I, for controlling the turning on and off of the message generating device GM and a second part, part II, with the

function of establishing and terminating the connection between message generating device GM and mixer TRM. A substantial portion of the functions which part I performs on message generating device GM is performed by the circuitry identified by solid line F in FIG. 1.

Part I is connected to the service signal receiving input terminal E2. Part I comprises a flip-flop BA1 consisting of two NOR gates P1 and P2 each having two input terminals. As is well known in the art, the output terminal of one gate is connected to the input terminal of the other gate. The free input terminal of each gate forms one input terminal of the flip-flop. The free input terminal of gate P1 is connected to input terminal E2 of the synchronizing circuit CS. Said input terminal E2 receives the service signals via a circuit which comprises an input transformer TRC, a low-pass filter PB, a Schmitt trigger circuit BS1, a polarity conversion or polarity conversion switch (inverter) IV1 and a differentiating circuit CD1. Said differentiating circuit comprises a capacitor C6 which is connected between the input terminal of gate P1 and inverter IV1 and a parallel connection circuit of resistor R5 and a diode D1 which connects the input terminal of gate P1 to the ground. The anode of the diode is grounded. Two inverters IV2 and IV3, each a NOT AND or a NAND gate, interconnected in series by their input terminals, are used as a Schmitt trigger circuit. A resistor R6 is installed in parallel to the inverters. The low-pass filter PB comprises a capacitor installed in parallel to the secondary winding of the transformer TRC and a series connection of a variable resistor R7 and a resistor R8 that is connected between the secondary winding of the transformer and the Schmitt trigger circuit BS1. The common connection point of resistors R8 and R7 is connected to the cathode of a diode D2, the anode of which is grounded. Furthermore, said common connection point is connected to the fixed contact of switch B1. The movable contact of said switch is connected to a positive potential point via a resistor R9. At rest, the switch is in its open position.

The output terminal of gate P1 forms an output terminal of flip-flop BA1. Said output terminal is connected via resistor R10 to the base of switching transistor T1. Resistor R11 and light-emitting diode DE1 are connected in series to the emitter circuit of said transistor. This diode may emit, for example, a red light. The emitter of said transistor T1 forms an output terminal of the control circuit for the message generating device GM.

The free input terminal of gate P2, which forms the second input terminal of flip-flop BA1, is connected to a voltage divider. Said voltage divider comprises resistor R12 that is connected to a positive potential point, variable resistor R13 which is grounded, Schmitt trigger circuit BS2 that is connected via resistor R14 and differentiating circuit CD2. The Schmitt trigger circuit BS2 and the differentiating circuit CD2 have the same constructions as Schmitt trigger circuit BS1 and differentiating circuit CD1, respectively. Inverters IV4 and IV5 and resistor R15 respectively correspond to inverters IV2 and IV3 and resistor R6. The differentiating circuit CD2

comprises a capacitor C8, a resistor R17 and a diode D4 which correspond to the capacitor C6, the resistor R5 and the diode D1, respectively.

The voltage divider may be constructed by a parallel connection of resistor R16 and resistor R12 via switch B2 which is open in its rest position.

The output terminal of gate P2 which forms a second output terminal of flip-flop BA1 is connected to switching transistor T2 via resistor R18. The emitter of said transistor forms a second control output terminal for the message generating device GM and is grounded via resistor R19 and a light-emitting diode DE2 that can emit a green light.

So that a connection can be made between transformer-mixing TRM and message generating device GM, part II of the synchronizing circuit C2 comprises a relay contact r1 which is connected between the input terminal E1 and the output terminal S of the synchronizing circuit CS. Contact r1 is open when at rest. Output terminal S is grounded via resistor R20. This contact r1 is operated by relay R which is connected to the emitter circuit of transistor T3. A connection circuit comprising resistor R1 and light-emitting diode DE3 that can emit a green light is connected in parallel to the relay R. Furthermore, diode D5 is connected across both terminals of relay R. The anode of the diode is grounded. The transistor T3 is controlled by flip-flop BA2. For this purpose, the output terminal of this flip-flop is connected to the base of the transistor T3 via resistor R22. A second output terminal of the flip-flop is connected to a series-connected circuit of resistor R23 and light-emitting diode DE4 which emits, for example, a red light. Just like flip-flop BA1, flip-flop BA2 comprises two NOR gates P3 and P4 each with two input terminals, one input terminal of each gate being connected to the output terminal of the other gate. The free input terminal of each gate forms a control input terminal of the flip-flop.

The control circuit for said flip-flop BA2 comprises a potentiometer P2 which is connected between the input terminal E1 of the synchronizing circuit CS and ground and a Schmitt trigger circuit BS3 whose input terminal is connected to the sliding contact of the potentiometer P2 and whose output terminals are connected to two parallel-connected input circuits each of which is connected to the free input terminals of gates P3 and P4. The input circuit of gate P3 comprises a differentiating circuit CD3. The input circuit of the other gate P4 comprises a differentiating circuit CD4 with an inverter IV6 disposed in a previous stage. The differentiating circuits CD3 and CD4 have the same construction as the differentiating circuit CD1. The differentiating circuit CD3 therefore comprises a capacitor C10, a resistor R24 and a diode D6. The elements of the differentiating circuit CD4 are designated by the reference symbols C11, R25 and D7, respectively. The Schmitt trigger circuit BS3 comprises two inverters, namely, switches IV7 and IV8. Connected in parallel with said inverters is resistor R26. A resistor R27 is connected across the sliding contact of the potentiometer P2 and the input terminal

of the Schmitt trigger circuit BS3. Furthermore, a diode D8 is connected between the sliding contact and ground. The anode of the diode is grounded.

Parts I and II of the synchronizing circuit CS are interconnected by diode D9 to enable part II to operate on part I.

Referring again to FIG. 1, the system according to the present invention also comprises a loudspeaker HP and a head receiver (i.e., an earphone) CE which may be connected to the system according to the present invention by means of two inverters or switches IN6 and IN7. Depending on the connection position of switch IN7, the loudspeaker or the earphone is or is not connected in parallel with telephone line section B.

The operation of the afore-described message-transmitting system according to the present invention is described next.

When inverters IN1 through IN5 are in their positions shown in FIG. 1, messages are immediately sent through the telephone network. The synchronizing circuit CS determines the timing for starting the sending of the message so that it is in synchrony with the arrival of a service signal.

Before the arrival of said signal from generator GS and prior to the closing of the switch B1, the flip-flop BA1 of the synchronizing circuit CS is biased so that the output of the gate P1 has a positive potential that represents a logical value of 1. The logical value of the output of the gate P2 is therefore 0. The logical value of the input terminal of the gate P1 which is connected to the output terminal of gate P2 is also 0. In view of the connection location of the capacitor C6, the logical value of the free input terminal of the gate P1 automatically becomes 0. As for gate P2, since capacitor C8 is connected, the logical value of its free input terminal is 0, but the logical value of the other input terminal is 1. Under these conditions, transistor T1 is ON and diode DE1 emits a red light, indicating that the message generating device GM is in the off or the inoperative state. In this case, the transistor T2 is off. As to the flip-flop or multi-vibrator BA2, since the logical value of the output of the gate P3 is 1 and due to the connection location of capacitor C11 and the fact that the logical value of the output terminal of gate P4 is 0, the logical value of both input terminals of the gates is 0. The logical values of the input terminals of the gate P4 are 0 and 1, respectively. Under such circumstances, the diode DE4 is energized. The transistor T3 is off and the relay R is not energized. Hence, contact r1 is open.

When switch B1 is closed, the flip-flop or multivibrator BA1 responds to the service signals that come from input terminal E2 of the synchronizing circuit CS. These signals change the logical value at the free input terminal of gate P1 from 0 to 1 and thus cause the state of flip-flop or multivibrator BA1 to toggle. The logical value of the output of gate P2 becomes 1, thereby making transistor T2 conducting and its emitter to generate a positive signal which is transmitted to and turns on the message generating device GM. The generator then starts

generating the signals that represent the message to be sent. These message signals cause the logical value at the free input terminal of gate P3 of the flip-flop or multivibrator BA2 to become 1, thereby causing the multivibrator or flip-flop BA2 to toggle, transistor T3 to become conducting, relay R to be energized and contact r1 to close. Once contact r1 closes, the message signals from the message generating device GM reaches the input terminal E2 of mixer TRM. The other input terminal E1 of mixer TRM receives the service signals. The output terminal S of the mixer produces a signal that is a mixture of both signals. The magnitude of said mixed signal may be adjusted by means of attenuator AT and amplifier AM which operates as a clipper amplifier. The messages from the message generating device GM may be of any suitable character such as music or an advertisement message. While a message is being transmitted, the potential at the two input terminals of gates P2 and P4 of multivibrators or flip-flops BA1 and BA2 represents 0 while the potential at the output terminals represents 1.

When the transmission of a message is completed, the logical value at the free input terminal of gate P4 returns to 1, thereby changing the state of the multivibrator or flip-flop BA2, blocking transistor T3, de-energizing relay R, opening contact r1 and hence disconnecting the connection between the mixer TRM and the message generating device GM. Said change in state of the flip-flop or multivibrator BA2 passes through diode D9 and causes the flip-flop or multivibrator BA1 to toggle. This causes the output terminal of gate P1 to have a positive potential again which causes transistor T1 to be conducting. A positive signal which is generated at the emitter of transistor T1 switches off the message generating device GM.

If it is desirable to stop message generating device GM before the end of a message, this can be accomplished by closing switch B2 which will cause the logical value at the free input terminal of gate P2 to change from 0 to 1. This changes the state of flip-flop or multivibrator BA1 which, as afore-described, turns off message generating device GM.

It is obvious that the afore-described system shown in FIGS. 1 and 2 may be modified in various ways without deviating from the scope of the present invention. For example, the mixer may be modified to have other desirable properties. The synchronizing circuit CS may comprise a means for stopping or switching off the message generating device GM at the end of a service signal. The message generating device GM may comprise any number of generating means, each of which may be connected to the transformer TRG through switches as shown on FIG. 1.

FIG. 3 shows a block diagram of an embodiment of the present invention which is adapted to a telematic system.

As shown in FIG. 3, in such a system, a subscriber's terminal X is connected by a subscriber telephone line LT to a central station Y. Said subscriber's terminal X comprises a telephone set AT and a data processing device TD adapted to reproduce onto a suitable support the information or data which is transmitted to terminal X over subscriber line LT. According to

the embodiment shown in the figure, the input terminals of the telephone set AT and of the data processing device TD are connected to the output terminals of a signal separator SP, the input of which is connected to the subscriber telephone line LT. The function of this signal separator is to separate the acoustic signals adapted to be read out or picked up by the receiver of the telephone set AT from the digital signals to be processed by data processing device TD.

In the illustrated embodiment, said data processing device TD usually comprises a display screen EV such as a cathode ray tube screen, a printing device IM such as a printer and a storage device ME. These various devices are connected to a modem MD1 which performs the conversion operations that are known in the art. The storage device ME is adapted to receive a series of information and to transmit them in parallel or in series at as high a speed as possible. The arrows shown with dotted lines and identified as *a* show the path by which the storage device acts on the display screen device EV and printer IM.

As for the central station Y, there is provided a mixer M whose two input terminals can be connected to a service signal generator GS and to a message generating device GM. The output terminal of the mixer is connected to subscriber line LT.

According to the present invention, the message generating device is adapted to be a device for generating signals such as data signals that can be processed by a data processing device such as data processing device TD in subscriber's terminal X. In other words, it generates messages that can be reproduced by a supporting device such as a display screen device EV or a printer IM.

With the assistance of modem MD2, the information to be sent to terminal X may be processed so as to correspond in terms of transmission speed and frequency bandwidth to the data signals that are normally transmitted by the network.

With the illustrated embodiment, the message generating device GM is operated by a control circuit C based on the operation of two detectors D1 and D2 which are connected to the telephone line between service signal generator GS and the mixer. The diode [sic] D1 detects the presence of a service signal in the subscriber's line, for example, a signal indicating that a subscriber has requested the use of terminal A [sic] by picking up the handset of telephone set AT and dialing the number of the telephone set, station or terminal with which the subscriber wishes to communicate. The detector D2 detects the moment a connection is established, in particular, that a called subscriber has answered by, for example, picking up the handset. Hence, the signal produced by the detector D1 is used by control circuit C to put the message generating device into operation and the signal from the detector D2 is used by control circuit C to stop message generating device GM. The message generating device GM continues to transmit messages during the entire process of establishing a telephone connection until the moment a positive answer arrives from the called subscriber's telephone set.

Needless to say, the detectors can be adapted so that more sophisticated functions are performed such as having the message generating device GM generate messages only during periods of absence of a service signal or only during a portion of the time that a line is being connected. To achieve these functions, the use of additional detectors will likely be necessary. Furthermore, it is also possible for the service signal generator GS to directly or indirectly control the message generating device in accordance with the type of service signals that it generates as indicated by dotted line *b* in the figure.

These various simple or even complex functions for controlling the message generating device GM may be implemented using any known appropriate methods.

It should furthermore be noted that the service signals consist of periods where oscillations with frequencies in the several hundred Hertz range (for example, between 400 and 500 Hz) are present. Because of this, these signals can be easily detected.

Given the above, it is readily understandable that if modem MD2 which forms the converter associated with the message generating device GM uses a carrier frequency that is sufficiently well separated from the frequencies used by the service signals, the separation of the service signals from the data signals can be easily accomplished by separator SP at subscriber's terminal A [sic].

The message transmission system that is illustrated comprises a switch CM1 for short-circuiting the mixer M and a switch CM2 adapted to directly connect the telephone set AT to the data processing device TD with respect to the telephone line LT and prevent the signals from being routed through separator SP. As indicated by arrow c shown in a dotted line, switch CM1 may be operated in synchrony with the operation of message generating device GM.

The operation of the message transmitting system should be readily apparent from the description of the system configuration and the functions of the various elements and devices that make up the system.

When a subscriber at terminal X wishes to communicate with another subscriber's telephone set, station or terminal (which may be a data bank, a banking transaction center or any other information facility) via a telephone or a data transmission network, the subscriber picks up the handset of telephone set AT. Then, a number of signals are sent from the central station to the subscriber requesting the performance of the steps necessary for establishing a telephone connection. Then, in accordance with the afore-described functions assigned to the detectors D1 and D2, the message generating device GM generates messages having the properties that allow the messages to be reproduced at subscriber terminal A [sic] from where the request for establishing a telephone connection originated. Before these signals reach mixer M and before these signals are fed to the subscriber telephone line LT where they may be superimposed onto the service signals, these signals are processed by modem MD2 to match the properties and the

capabilities of the network. The processing that is performed, of course, differs depending on whether the telephone lines that are used are, for example, ordinary coaxial cables or special lines such as optical fibers. It is well known that, if special lines are used, the output of binary digits or bits, i.e. the transmission rate or the modulation speed, may be made much higher to the point that even television signals may be transmitted. For these reasons, modems MD1 and MD2 should be designed in accordance with the modulation speed that is tolerated by the network.

The system according to the present invention makes possible the transmission of data from the message generating device GM throughout the period of establishing a telephone connection.

The data signals that are transmitted to the subscriber's terminal X via separator SP may be directly or indirectly displayed and viewed on the display screen device EV or printed out by printer IM. If the network provides a sufficient transmission rate, the calling subscriber can, for example, see a television picture or a text appearing on his screen. If the telephone line does not provide a sufficiently high transmission rate, i.e., a binary digit or bit output transmission rate that is high enough for direct display as an image on display screen device, the information may be stored in a storage or a memory device ME and transmitted later with a sufficient level of output to the display screen device or a printer.

Various adaptations are possible with the message transmitting system according to the present invention without departing from the afore-described principle of the present invention. Needless to say, the embodiment of the system shown in FIG. 3 can use a synchronizer circuit of the types shown in FIGS. 1 and 2.

Conversely, the control circuit for the detectors such as shown and described in relation to the system shown in FIG. 3 may be used instead of the synchronizer in the embodiment shown in FIG. 1. In this way, with the first embodiment, messages may be generated during periods where no signals are present such as between two sequential service signals. As a general rule, any means that is used in one embodiment of the present invention may be used in the other embodiments so long as appropriate, practical and equivalent modifications are made.

4. Brief Description of the Figures

FIG. 1 is a block diagram showing the principle of the message transmission system according to the present invention. FIG. 2 shows the circuit configuration of the synchronizing device shown in the block diagram in FIG. 1. FIG. 3 is a block diagram of another embodiment of the present invention wherein messages are visually displayed.

GS. Electrical signal generating device (or service signal generating device)

A, B. Telephone line section (input line section)

SR. Telephone network section
TRS, TRG. Transformer
IN1 – IN7. Switch
TRM, M. Mixer
E1, E2. (Mixer) input terminal
S. (Mixer) output terminal
AM. Differential amplifier
AT. Attenuator
CS. Synchronizing circuit
GM. Message generating device (message generator)
P1. Potentiometer
D1 – D8. Diode
SEM. Modulation source
I. Part 1 (of synchronizing circuit) (first circuit arrangement)
II. Part 2 (of synchronizing circuit) (second circuit arrangement)
BA1, BA2. Flip-flop
P1, P2. NOR gate
TRC. Input transformer
PB. Resistance filter
BS1 – BS3. Schmitt trigger circuit
IV 1 – IV8. Inverter
CD1 – CD4. Differentiating circuit
B1, B2. Switch
T1 – T3. Transistor
R. Relay
r. Relay contact
HP. Loudspeaker
CE. Earphone
AT. Telephone set
LT. Subscriber line
X. Subscriber terminal
Y. Central station
TD. Processing device
SP. Signal separator
EV. Display screen device
IM. Printer

ME. Memory device (or storage device)
MD1, MD2. Modem
C. Control circuit
D1, D2. Detector
DE1 – DE4. Light emitting diode

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FIG. 1

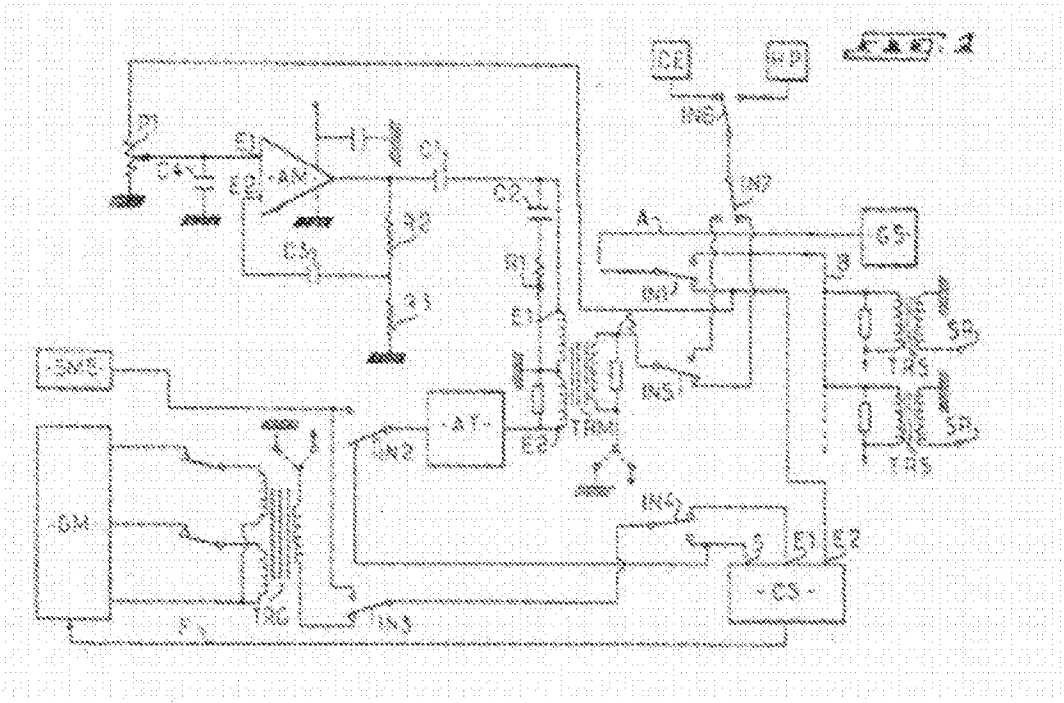

FIG. 2

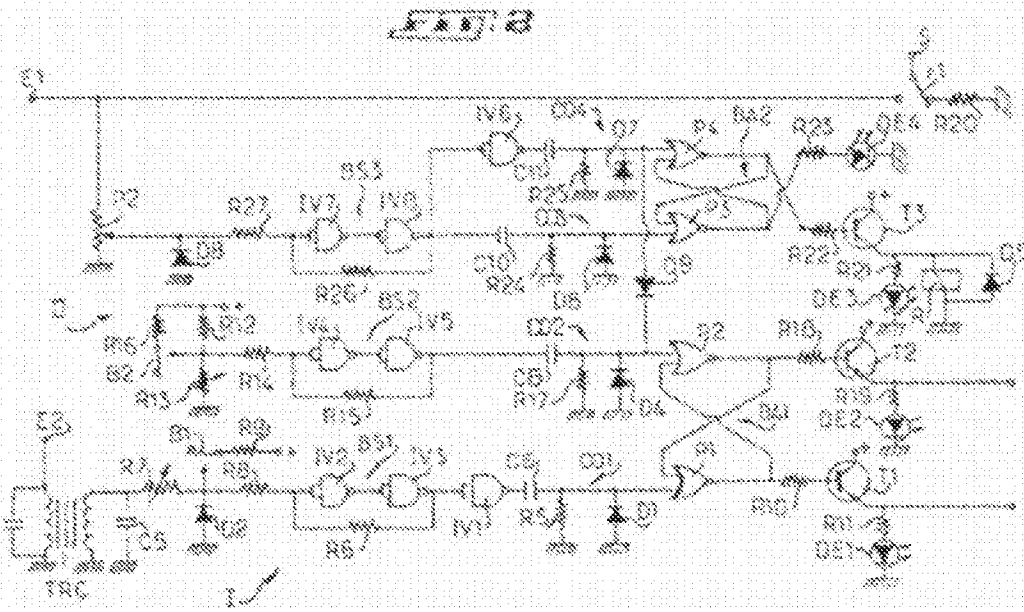

FIG. 3